client computer **20** can be modified to direct the equivalent reference file attachment elements **100** created in the Working Design File **55** to "point to" the Shadow Directory **120**. In addition, the step of creating equivalent Working Design Files **55** for the reference files can be omitted.

As discussed above, the synchronization/merging process, commit process and model storage process each occur entirely within the component realm. As also discussed above, the user typically does not directly edit components in his or her briefcase. Instead, the user edits the components via a file-oriented CAD tool. However, the scope of the present invention includes schemes wherein the user directly edits components in the briefcase. The main constraint for directly editing components is that users are unfamiliar with editing components. Thus, once users become familiar with components, the file-oriented editing interface can be eliminated, thereby eliminating the need for the translators and simplifying the overall process which can then be implemented entirely within the component realm.

The present invention may be implemented by any suitable combination of software and hardware. The software is implemented as a computer program product including at least one computer readable medium having computer logic recorded thereon to perform the functions discussed above.

It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A method for synchronizing changes to a plurality of components stored in a central repository, the repository being accessible to plural users, each of whom are permitted to revise the components in the repository, the components representing file-based data of an engineering design file, the method comprising:

(a) a user creating a temporary design file at a local computer workstation by downloading the current data in the repository and converting the current data to create an original current version of the design file at the workstation;

(b) the user creating an edited version of the temporary design file from the original current version;

(c) the user requesting that the set of components which represent the edited version of the temporary design file be updated to reflect any component changes made in the repository since the creation of the original current version of the temporary design file by other users during the user's step (b) editing time period; and

(d) during updating, locally detecting resolvable and unresolvable component conflicts on a per component basis between the components which represent the edited temporary version of the design file and the latest current version of the components.

2. A method according to claim **1** further comprising:

(e) allowing the components represented by the locally updated and edited temporary version of the design file to replace the latest current version of the components in the repository only if no unresolved component conflicts exist between the two versions.

3. A method according to claim **2** further comprising:

(f) archiving (i) the latest version of the individual components, and (ii) information to fully document any changes made to each version of each component.

4. A method according to claim **1** further comprising:

(e) highlighting to the user any unresolvable component conflicts.

5. A method according to claim **1** wherein resolvable component conflicts detected in step (d) include differences that relate to different components which are not affected by each other or different aspects of the same component which do not conflict with one another.

6. A method according to claim **1** wherein unresolvable component conflicts detected in step (d) include differences that relate to the same aspects of a component or that relate to components which affect each other in a conflicting manner.

7. An apparatus for synchronizing changes to a plurality of components stored in a central repository, the repository being accessible to plural users, each of whom are permitted to revise the components in the repository, the components representing file-based data of an engineering design file, the apparatus comprising:

(a) means for creating a temporary design file at a local computer workstation by downloading the current data in the repository and converting the current data to create an original current version of the design file at the workstation, the temporary design file being manipulated by a user;

(b) means for creating an edited version of the temporary design file from the original current version, the edited version being created by the user during an editing time period;

(c) means for requesting that the set of components which represent the edited version of the temporary design file be updated to reflect any component changes made in the repository since the creation of the original current version of the temporary design file by other users during the user's editing time period; and

(d) means for locally detecting resolvable and unresolvable component conflicts on a per component basis between the components which represent the edited temporary version of the design file and the latest current version of the components during the updating.

8. An apparatus according to claim **7** further comprising:

(e) means for allowing the components represented by the locally updated and edited temporary version of the design file to replace the latest current version of the components in the repository only if no unresolved component conflicts exist between the two versions.

9. An apparatus according to claim **8** further comprising:

(f) means for archiving (i) the latest version of the individual components, and (ii) information to fully document any changes made to each version of each component.

10. An apparatus according to claim **7** further comprising:

(e) means for highlighting the unresolvable component conflicts.

11. An apparatus according to claim **7** wherein resolvable component conflicts detected by the means for locally detecting resolvable and unresolvable component conflicts include differences that relate to different components which are not affected by each other or different aspects of the same component which do not conflict with one another.

12. An apparatus according to claim **7** wherein unresolvable component conflicts detected by the means for locally detecting resolvable and unresolvable component conflicts include differences that relate to the same aspects of a component or that relate to components which affect each other in a conflicting manner.

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